Claims

[c1] 1. An optical device for splitting an incident beam of light into a reflected beam and a transmitted beam and selectively transmitting only a narrow bandwidth of the transmitted beam, the device comprising:

a splitter interface adjoining a first region and a second region, wherein said splitter interface is suitable for splitting the incident beam into the reflected beam and the transmitted beam;

a front-cavity interface adjoining said second region and a third region;

a rear-cavity interface adjoining said third region and a fourth region;

said front-cavity interface being oriented to receive the transmitted beam from said splitter interface and direct the transmitted beam onward toward said rear-cavity interface at a normal angle; and

said front-cavity interface and said rear-cavity interface being fixedly spaced apart by said third region, being plainerly parallel, and both being partially reflective, thereby defining an optical cavity of a Fabry-Perot interferometer and providing both beam splitting and etalon functionality in the device.

[c2] 2. The device of claim 1, wherein said splitter interface includes a partially reflective coating to split the incident beam into the reflected beam and the transmitted beam.

[c3] 3. The device of claim 2, wherein said coating is polarized.

[c4] 4. The device of claim 1, wherein:

said first region and said second region have differing indices of refraction; and

said splitter interface is oriented to receive the incident beam at a non-normal angle of incidence such that the reflected beam is reflected and the transmitted beam is refracted, thereby splitting the incident beam into the reflected beam and the transmitted beam.

[c5] 5. The device of claim 1, wherein said front-cavity interface includes an anti-reflective coating to facilitate the transmitted beam passing through said front-cavity interface and thus from said second region and into said third region.

[c6] 6. The device of claim 1, wherein at least one of said front-cavity interface and said rear-cavity interface include a partially reflective coating to facilitate reflecting the transmitted beam within said optical cavity.

[c7] 7. The device of claim 1, wherein said second region and said third region have differing indices of refraction to facilitate reflecting the transmitted beam within said optical cavity.

[c8] 8. The device of claim 1, wherein said third region and said fourth region have differing indices of refraction to facilitate reflecting the transmitted beam within said optical cavity.

[c9] 9. The device of claim 1, wherein said first region is of a gas material or vacuum and said second region is of a solid material.

[c10] 10. The device of claim 9, wherein said second region includes an optical wedge.

[c11] 11. The device of claim 1, wherein said first region and second region are both of solid materials.

[c12] 12. The device of claim 11, wherein said first region and said second region each include optical wedges.

[c13] 13. The device of claim 1, wherein said second region is of a gas material or vacuum and said third region is of a solid material, thereby having said optical cavity in a solid type etalon.

[c14] 14. The device of claim 1, wherein said second region and third region are both of solid materials, thereby having said optical cavity in a solid type etalon.

[c15] 15. The device of claim 1, wherein said third region is of a gas material or vacuum and said fourth region is of a solid material, thereby having said optical cavity in an air-spaced type etalon.

[c16] 16. The device of claim 15, further comprising at least one spacer that fixedly spaces apart said front-cavity interface and said rear-cavity interface.

[c17] 17. The device of claim 1, wherein said third region and fourth region are both of solid materials, thereby having said optical cavity in a solid type etalon.

[c18] 18. The device of claim 1, wherein said splitter interface is a first splitter interface and the device further comprising at least one second splitter interface.

[c19] 19. The device of claim 18, wherein a said second splitter interface is in the optical path of the incident beam ahead of said first splitter interface, thereby facilitating splitting out a portion of the incident beam before it is split into the reflected beam and the transmitted beam.

[c20] 20. The device of claim 18, wherein a said second splitter interface is in the optical path of the reflected beam, thereby facilitating splitting the reflected beam into multiple portions.

[c21] 21. The device of claim 18, wherein a said second splitter interface is in the optical path of the transmitted beam after said optical cavity, thereby facilitating splitting the transmitted beam into multiple portions.

[c22] 22. An optical device for splitting an incident beam of light into a reflected beam and a transmitted beam and selectively transmitting only a narrow bandwidth of the transmitted beam, the device comprising:

splitter interface means for splitting the incident beam into the reflected beam and the transmitted beam;

front-cavity interface means for receiving the transmitted beam from said splitter interface means and passing the transmitted beam there through, wherein no intervening optical interfaces separate said front-cavity interface means from said splitter interface means;

rear-cavity interface means for receiving the transmitted beam from said front-cavity interface means, wherein said front-cavity interface means and said rear-cavity interface means are plainerly parallel and fixedly spaced apart;

said front-cavity interface means and said rear-cavity interface means both further for redirecting the transmitted beam there between a

plurality of times; and

said rear-cavity interface means further for ultimately passing the transmitted beam there through, thereby providing beam splitting and etalon functionality in an integrated manner.

[c23] 23. The device of claim 22, wherein said splitter interface means includes partially reflective means for splitting the incident beam into the reflected beam and the transmitted beam.

[c24] 24. The device of claim 22, wherein:

said splitter interface means includes a junction of two differing indices of refraction; and

said splitter interface means is oriented to receive the incident beam at a non-normal angle of incidence such that the reflected beam is reflected and the transmitted beam is refracted at said junction.

[c25] 25. The device of claim 22, wherein at least one of said front-cavity interface means and said rear-cavity interface means include a partially reflective coating to facilitate reflecting the transmitted beam within said optical cavity.

[c26] 26. The device of claim 22, wherein at least one of said front-cavity interface means and said rear-cavity interface means include a junction of two differing indices of refraction to facilitate reflecting the transmitted beam within said optical cavity.

[c27] 27. The device of claim 22, wherein said splitter interface means is at a junction of a gas material or vacuum and a solid material.

[c28] 28. The device of claim 22, wherein said splitter interface means is at a junction of two solid materials.

[c29] 29. The device of claim 22, wherein said front-cavity interface means is at a junction of a gas material or vacuum and a solid material.

[c30] 30. The device of claim 22, wherein said front-cavity interface means is at a junction of two solid materials, thereby having said optical cavity in a solid type etalon.

[c31] 31. The device of claim 22, wherein said rear-cavity interface means is at a junction of a gas material or vacuum in said optical cavity and a solid material, thereby having said optical cavity in an air-spaced type etalon.

[c32] 32. The device of claim 31, further comprising at least one spacer means for fixedly spacing apart said front-cavity interface means and said rear-cavity interface means.

[c33] 33. The device of claim 22, wherein said rear-cavity interface means is at a junction of two solid materials, thereby having said optical cavity in a solid type etalon.

[c34] 34. A method for splitting an incident beam of light into a reflected beam and a transmitted beam and selectively transmitting only a narrow bandwidth of the transmitted beam, the method comprising the steps of:

(a) splitting the incident beam into the reflected beam and the transmitted beam at a splitter interface;

(b) receiving the transmitted beam at a front-cavity interface from said splitter interface, wherein no intervening optical interfaces separate said splitter interface and said front-cavity interface;

(c) passing the transmitted beam through said front-cavity interface and directing the transmitted beam toward a rear-cavity interface at a normal angle;

(d) receiving the transmitted beam at said rear-cavity interface, wherein said front-cavity interface and said rear-cavity interface are plainerly parallel and fixedly spaced apart;

(e) reflecting the transmitted beam between said front-cavity interface and said rear-cavity interface a plurality of times; and

(f) passing the transmitted beam through said rear-cavity interface, thereby providing both integrated beam splitting and etalon functionality.

[c35] 35. The method of claim 34, wherein said step (a) includes reflecting the reflected beam and passing the transmitted beam at a partially reflective coating at said splitter interface.

[c36] 36. The method of claim 34, wherein:

said splitter interface includes a junction of two differing indices of refraction; and

said step (a) includes orienting said splitter interface to receive the incident beam at a non-normal angle of incidence such that the reflected beam is reflected and the transmitted beam is refracted at said junction.

[c37] 37. The method of claim 34, wherein said step (e) includes partially reflecting the transmitted beam within said optical cavity at a partially reflective coating at said front-cavity interface.

[c38] 38. The method of claim 34, wherein:

said front-cavity interface includes a junction of two differing indices of refraction; and

said step (e) includes partially reflecting the transmitted beam at said junction.

[c39] 39. The method of claim 34, wherein said step (e) includes partially reflecting the transmitted beam within said optical cavity at a partially reflective coating at said rear-cavity interface.

[c40] 40. The method of claim 34, wherein:

said rear-cavity interface includes a junction of two differing indices of refraction; and

said step (e) includes partially reflecting the transmitted beam at said junction.

[c41] 41. The method of claim 34, wherein a plurality of the incident beams are provided and said steps (a)-(f) are concurrently performed on said plurality of the incident beams to provide respective pluralities of the reflected beams and the transmitted beams.